

# ***AGRICULTURAL DRAINAGE***

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## **ACTIONS- 1, 8, 10, 11, 12, 13, 14, 15, 16, 32B, 33**

- Action 1:** Control the timing of agricultural drainage discharge to coincide with periods when dilution flow is sufficient to achieve CALFED water quality target concentrations.
- Action 8:** Improve water circulation in the Delta by development of improvements at the head of Old River to block fish movement into Old River and by management of water flow and stage down Old River.
- Action 10:** Combined with Action 11.
- Action 11:** Implement additional agricultural source control for water quality parameters of concern found in agricultural surface and sub-surface drainage. Implementation may include incentives and/or enforcement of existing regulations.
- Action 12:** Improve source irrigation water quality in sub-surface drainage source areas. All things being equal, higher quality irrigation water will result in better quality drainage.
- Action 13:** Provide incentives to fallow or retire land that is a major source of water quality parameters of concern. Landowner participation should be voluntary and by compensated purchase or lease payment.
- Action 14:** Reduce the loadings of water quality parameters of concern entering the Delta and San Joaquin tributaries by concentrating and disposing of agricultural sub-surface drainage in evaporation ponds in the San Joaquin Valley.
- Action 15:** Reduce the loadings of water quality parameters of concern entering the Delta and its tributaries by treating agricultural surface drainage and/or Delta agricultural sub-surface drainage in constructed wetlands.
- Action 16:** Reduce the loadings of water quality parameters of concern entering the Delta and San Joaquin tributaries by treating a significant portion of San Joaquin agricultural sub-surface drainage by reverse osmosis or other means.

**Action 32B:** Implement additional agricultural source control for water quality parameters of concern found in agricultural surface and sub-surface drainage. Implementation may include provision of incentives for pesticide users to increase implementation of best management practices (BMPs) including integrated pest management (IPM) to reduce pesticide loads and concentrations from agricultural drainage.

**Action 33:** No action description.

A first step in solving drainage problems is to reduce the production of drainage water; that is, to control drainage production at the source. Source control options encompass a broad array of measures to apply irrigation water more efficiently, and to manage land and water in ways that reduce the magnitude and adverse effects of drainage and drainage related problems. In anticipation of securing funding to implement certain water quality improvement projects in advance of completing environmental documentation for the CALFED process, a solicitation of candidate projects was made. The candidate projects were to demonstrate water quality benefits to the Bay-Delta estuary, for the water quality parameters that have been identified as being of concern. In addition, solicited projects were to be consistent with the water quality actions being studied in the CALFED Water Quality Program. Table 1 is a summary of Early Implementation Projects; that is projects for which a solicited response including estimated funding requirements was received. These projects vary in stage of development from conceptual proposals to mid-term completion. Table 2 is a summary of projects identified as Other Potential Implementation Projects. These projects also vary in stage of development, however, they are applicable to CALFED goals, and may be viable for future implementation.

**Table 1 Summary of Identified Early Implementation Projects**

| <b>Project Classification</b>             | <b>Project Name</b>  | <b>Project Number</b> |
|---|--|-----------------------|
| <b>Subsurface Drainage Source Control</b> | Tailwater/Tilewater separation project   | 11-5                  |
| <b>Delta Drainage Source Control</b>      | Treatment of agricultural drain water and coordinated dis-charge of agricultural drain water based on real-time monitoring of water quality in the Delta and its tributaries | 1-3, was 1-3(new)     |
|   | Improvement of agricultural drain water through land management.   | 13-2                  |

**Table 2 Summary of Identified Potential Implementation Projects**

| <b>Project Classification</b>             | <b>Project Name</b>  | <b>Project Number</b> |
|---|--|-----------------------|
| <b>Surface Drainage Source Control</b>    | Implementation of integrated pest management in surface drainage source areas, especially for parameters of concern.<br>Tailwater/Tilewater separation project | 11-1, 32B-1<br>11-5   |
|   | Alter pesticide chemistry and define fate and transport of constituents of concern.  | 11-2                  |
|   | Habitat enhancement landowner program (HELP)   | 11-3, 15-1, 33-1      |
|   | Temporarily store drainage in wetlands or other impoundment's, then time release to avoid creating high concentrations of parameters of concern.               | 11-7                  |
|   | Optimal tailwater recovery systems.  | 11-8                  |
|   | Review sludge management in land application systems.  | 11-9                  |
| <b>Subsurface Drainage Source Control</b> | Storage and timed release of subsurface drainage.  | 1-1                   |
|   | Efficient water management in selenium-source areas  | 11-4                  |
|   | Reconstruct subsurface drainage systems  | 11-6                  |
|   | Fallowing of lands in selenium-source areas through a voluntary program.   | (13) 11-10, 15-4      |
|   | Implementation of drainage water reuse/agroforestry/evaporation pond/salt recycling system on a pilot scale.   | 11-11                 |
|   | Installation of shallow subsurface drains.   | 13-1                  |
|   | Treatment of wetlands for selenium volatilization.   | (15) 14-1, 16-1       |
| <b>Delta Drainage Source Control</b>      | Create wetlands to accomplish several things simultaneously  | 1-2, 15-2             |
| <b>Other Projects Identified</b>          | Wider implementation of ecolaboratories (irrigation system performance evaluation).  | 15-3                  |

# **IDENTIFIED EARLY IMPLEMENTATION PROJECTS**

**Project Name:** Treatment of Agricultural Drain Water and Coordinated Discharge of Agricultural Drain Water Based on Real-Time Monitoring of Water Quality in the Delta and its Tributaries.

**Project Number:** 1-3

**Project Manager:** \_\_\_\_\_

**Agency Name:** Department of Water Resources, Division of Local Assistance

**Address:** 1020 Ninth Street, Sacramento, CA 95814

**Name/Title of Project Manager:** Richard Breuer, Chief, Municipal Water Quality

**Phone/Fax/E-mail:** (916)327-1725/(916)327-1648-fax

Investigations program rich@water.ca.gov

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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**Project Description:**

The goal of this five-year demonstration is to improve water quality in Delta waters through 1) on-site treatment of agricultural drain water prior to discharge and 2) controlled timing of discharge of agricultural drain water based on real-time monitoring of water quality in the Delta and its tributaries.

This demonstration would use commercially available waste water treatment methods in combination with the use of wetlands to reduce various contaminants of concern in agricultural drain waters. These contaminants of concern would include nutrients, heavy metals, pesticides, turbidity, salinity, pathogenic organisms, total organic carbon, and minerals. The combined treatment system proposed would entail creation of wetlands as the first pass-through medium for treatment to reduce contaminants such as nutrients, heavy metals, and turbidity. The resulting effluent would then pass through a wastewater treatment plant which would provide further treatment to reduce other contaminants such as organic carbon and pathogenic organisms. The cost and effectiveness of this dual system would be measured and reported.

In addition to the pilot treatment system described above, a network of on-line telemetered analytical instruments for water quality measurements will be installed at key locations within the Delta and its tributaries to provide real-time monitoring of water quality. This on-line data and

hydraulic models of Delta channels would be used to determine the optimum time for discharge of agricultural drain waters. Real-time monitoring of water quality would include telemetered data on temperature, electrical conductivity, dissolved oxygen, pH, turbidity, and total organic carbon. It is anticipated that this coordinated system of agricultural drain water discharge would provide water quality benefits to both the ecosystem and the drinking water community.

**Expected Water Quality Benefits:**

1) Reduction of various contaminants of concern in agricultural drain waters, including heavy metals, pesticides, turbidity, salinity, pathogens, total organic carbon, and minerals. 2) Reduction of concentrations and fluctuations of contaminants of concern in Delta waters through timing of discharge.

**Map Location:** The demonstration would be conducted on Twitchell Island. A map of the island is included.

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    | X           |           | June 1997           |                |
| Planning                 |             |           |                     | X              |
| Design                   |             |           |                     | X              |
| Environmental Compliance |             |           |                     | X              |

**Project Status and Current Funding:**

A bench scale feasibility study is currently underway on the use of commercially available waste water treatment methods to reduce organic carbon in agricultural drain water on Twitchell Island. In addition, the use of an autoanalyzer for real-time monitoring of total organic carbon is currently being evaluated. Finally, a draft study plan to evaluate the water quality impacts of wetlands developed for reduction of organic soil subsidence on Twitchell Island. To implement this demonstration, current efforts would be expanded to include the use of multi-parameter autoanalyzers and the evaluation of wastewater treatment reduction of

other contaminants in addition to organic carbon.

Total funding of these studies is currently \$175,000. Of this amount, \$25,000 is earmarked for the set up and evaluation of the TOC autoanalyzer, \$50,000 is earmarked for the bench scale feasibility study on the treatment of TOC in agricultural drain water, and \$100,000 is earmarked for evaluating the water quality impacts of wetlands developed for reduction of organic soil subsidence.

**Anticipated Construction Start Date:** October 1, 1997

**Anticipated Construction Completion Date:** December 1997

|                              |                                 |   |
|------------------------------|---------------------------------|---|
| <b>Project Cost Summary:</b> | <b>Study:</b>                   | \$ <u>175,000</u> *   |
|                              |                                 | Study elements currently underway.  |
|                              | <b>Planning:</b>                | \$ <u>100,000</u> *   |
|                              |                                 | One PY  |
|                              | <b>Design:</b>                  | \$ <u>370,000</u>   |
|                              |                                 | One PY and purchase/ installation of three multi-parameter autoanalyzers and two additional TOC auto-analyzers. |
|                              | <b>Construction:</b>            | \$ <u>450,000</u>   |
|                              |                                 | Construction of 30 acre wetland and two water treatment plants.   |
|                              | <b>Construction Management:</b> | \$ <u>40,000</u>  |
|                              | <b>Administration:</b>          | \$ <u>100,000</u> * One PY  |
|                              | <b>Total:</b>                   | \$ <u>1,235,000</u>   |

\* Contributions by DWR (see below)

**Estimated Annual Operations and Maintenance Cost:**

The estimated annual costs for operations and maintenance for this demonstration is \$695,000 based on the following breakdown:



|  |            |
|--|------------|
| Sampling, Analysis, Quality Assurance/<br>Quality Control, Reporting | \$350,000* |
| O&M of Wetlands  | \$20,000   |
| O&M of Autoanalyzers   | \$75,000   |
| O&M of Water Treatment Plants  | \$250,000  |

\*Partial Contributions by DWR (see below)

Estimated Contributions by DWR:

Start-up

\$200,000 for two PYs (Planning and Administration)

\$175,000 for current studies underway

Annual O&M

\$100,000 for one PY (Sampling, QA/QC, and Reporting)

Other Considerations: This demonstration would develop wetlands to treat agricultural drain water. Wetlands on peat soils are also being studied by DWR and U.S. Geological Survey as a means of reducing subsidence, and therefore, protecting levees in the Delta. Wetlands also are important to DWR because of waterfowl habitat development. The Division of Planning has developed habitat matrices for Twitchell Island that integrates permanent and seasonal wetlands into the land management plan. DLA is already conducting soil Total Organic Carbon studies with USGS on Twitchell Island, as well as developing a study to evaluate the water quality impacts from the subsidence wetland project on Twitchell Island. This treatment project would integrate into the current subsidence, habitat development, and water quality study plans on Twitchell Island.

The real-time water quality monitoring component of this demonstration would provide benefit for both the drinking water and ecological communities. Access to real-time water quality data in the Delta and its tributaries would provide the following benefits:

1. Fish and water fowl managers would be advised of opportunities to coordinate their releases to minimize water quality fluctuations.
2. Drainage dischargers would be advised of opportunities to adjust discharge so as not to exceed the assimilative capacity of channel waters or further degrade drinking water quality.
3. Diverters would be advised when to adjust diversions to avoid

reducing the assimilative capacity of channel waters or to avoid diverting an excessive amount of salt and organic carbon.

**Project Name:** Tailwater/Tilewater Separation Project

**Project Number:** 11-5

**Project Manager:** \_\_\_\_\_

**Agency Name:** Firebaugh Canal Water District

**Address:** 2412 Dos Palos Road (P.O. Box 97) Mendota, CA 93640

**Name/Title of Project Manager:** Jeff Bryant, District Manager

**Phone/Fax/E-mail:** (209) 659-1245, FAX (209) 655-3658

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

San Luis & Delta-Mendota Water Authority

Drainage Activity Agencies

**Project Description:** The Firebaugh Canal Water District is a member of the Grassland Basin Drainage Activity under the umbrella of the San Luis & Delta-Mendota Water Authority. This is part of a 97,000 acre drainage area in the San Joaquin Valley bounded by Interstate 5, Dos Palos and Mendota that has historically discharged subsurface tilewater and tailwater to the San Joaquin River. Recently this entity implemented the Grassland Bypass Project (see attached report) which utilizes a portion of the San Luis Drain to convey drainage water to the San Joaquin River and to bypass the grassland wetlands area for environmental benefit purposes. Historically this discharge of drainage-water included a combination of subsurface tilewater and surface tailwater. Firebaugh Canal Water District is a 22,000 acre portion within the Grassland Basin Drainage Area. The project is to provide assistance to separate the tailwater and tilewater thereby reducing the drainage quantity so it can be managed and controlled by conserving the water supply. Attached is a map showing the area of the project and table with an estimate of cost.

**Expected Water Quality Benefits:**

The drainage discharge from the Grasslands Basin drainage area contributes salt, selenium and turbidity to the San Joaquin River Delta. This is an historic discharge and has occurred for many years. It is expected the discharge will decrease with the implementation of the

Grasslands Bypass Project and the mitigation measures related to that project including selenium load targets and reductions. The tailwater and tilewater separation project will reduce the amount of drainage water that would be discharged to the San Joaquin River including the tailwater component which tends to be high in suspended solids and turbidity. The remaining drainage component (the tilewater) would be reduced in quantity and more easily managed for discharge to the San Joaquin River to meet the load reductions necessary for the Grassland Bypass Project which would result in decreased loads to the Sacramento-San Joaquin Delta.

**Map:** A map showing the project area is attached.

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             | x         |                     |                |
| Planning                 |             | x         |                     |                |
| Design                   |             |           | 3/1/97              |                |
| Environmental Compliance |             |           | 3/1/97              |                |

**Anticipated Construction Start Date:** May 1, 1997

**Anticipated Construction Completion Date:** December 31, 1997

**Project Cost Summary:**

|                          |                     |
|--------------------------|---------------------|
| Study:                   | \$ _____            |
| Planning:                | \$ <u>15,000</u>    |
| Design:                  | \$ _____            |
| Construction:            | \$ <u>2,460,000</u> |
| Construction Management: | \$ _____            |
| Administration:          | \$ <u>25,000</u>    |
| <b>Total:</b>            | \$ <u>2,500,000</u> |

See attached detailed estimated cost of construction

**Estimated Operations and Maintenance Cost:**

Operation and maintenance would be included within the annual budget of the Firebaugh Canal Water District. Currently they maintain drainage facilities within the District and this would be incorporated into their management budget.

**Estimated Agency Contributions:**

Firebaugh Canal Water District would contribute excavating equipment and operator time for the project. This would make the District's contribution equal to approximately \$400,000.

**Other Considerations:**

**Project Name:** Improvement of agricultural drain water through land management.

**Project Number:** 13-2

**Project Manager:** \_\_\_\_\_

**Agency Name:** Department of Water Resources, Divisions of Local Assistance and Planning.

**Address:** 1020 Ninth Street, Sacramento, CA 95814

**Name/Title of Project Manager:** Richard Breuer, Chief, Municipal Water Quality

**Phone/Fax/E-mail:** (916)327-1725/(916)327-1648-fax

Investigations program rich@water.ca.gov

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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**Project Description:**

The goal of this five-year demonstration is to improve water quality in Delta waters through various land management practices. Current agricultural uses of crops that require extensive tillage, irrigation, and pesticides will be replaced with various options, including permanent pasture, grazing, and green chopping, and evaluated on their benefits in reducing the quantity and improving the quality of agricultural drain water. To implement this demonstration, two plots of land will be used for side-by-side comparisons of agricultural drain water quality resulting from two different agricultural uses.

**Expected Water Quality Benefits:**

Reduction of quantity and improvement of quality of agricultural drain water. Expected reduction of parameters of concern include heavy metals, pesticides, salinity, turbidity, and total organic carbon.

**Map:** It is anticipated that this demonstration would be conducted on Sherman Island. A map of the study area is not currently available.

**Project Status:**

DWR's Division of Planning has developed various proposals to convert

areas of high tillage agricultural crops to other uses such as creation of wetlands, upland and riparian habitat, and low tillage options such as grazing and permanent pasture.

DWR's Division of Planning has developed various proposals to convert areas of high tillage agricultural crops to other uses such as creation of wetlands, upland and riparian habitat, and low tillage options such as grazing permanent pasture. Although these proposals have not yet been implemented, plans have been made to provide \$30,000 to fund water quality monitoring for demonstrations associated with land management.

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Project Cost Summary:**

The total start-up costs for this demonstration are based on the following program elements:

|                     |           |  |
|---------------------|-----------|--|
| Study/Planning      | \$30,000* | Collection of water quality data at selected study site and survey of land use practices.                          |
| Design/Construction | \$150,000 | Physical design of study site and implementation and coordination of changes in operations and land use practices. |
| Administration      | \$100,000 | One PY   |
| Total               | \$280,000 |  |

\*Contributions by DWR (see below)

**Estimated Annual Operations and Maintenance Cost:**

The estimated annual costs for operations and maintenance for this demonstration is \$275,000 based on the following breakdown:

|   |            |
|---|------------|
| Sampling, Analysis, Quality Assurance<br>/Quality Control and Reporting | \$225,000* |
| Operations and Maintenance  | \$50,000   |

\*Partial Contributions by DWR (see below)

Estimated Contributions by DWR:

Start-up

\$130,000 for one and one-third PYs (Study/Planning and Administration)

Annual O&M

\$100,000 for one PY (Sampling, QA/QC, and Reporting)

**Other Considerations:**

This demonstration would provide pertinent water quality data in conjunction with the evaluation of land use changes being implemented in the western Delta to meet subsidence goals, along with the development of waterfowl habitat. One of the goals of this demonstration is to reduce high tillage agriculture, yet retain some commercial agricultural income. As identified in previous studies, pasture and fallow grazing land provides excellent habitat for geese. This demonstration would provide documentation of the water quality improvements through reduction in pesticide use and reduce organic carbon transport from tilled fields. It would also provide an opportunity to quantify habitat improvement for geese through land use changes to meet current Delta objectives for wildlife.



**Project Name:** Real Time Monitoring Program

**Project Number:** Was 1-3

**Project Manager:** \_\_\_\_\_

**Agency Name:** San Luis-Delta Mendota Water Authority

**Address:** 842 6th Street, Suite 7 (P.O. Box 2157) Los Banos, CA 93635

**Name/Title of Project Manager:** Dennis Wichelns, Drainage Coordinator

**Phone/Fax/E-mail:** (209) 826-9696, FAX (209) 826-9698

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

Panoche Drainage District, Firebaugh Canal Water District, Pacheco Water District, Charleston Drainage District, Broadview Water District, Camp 13 Drainage District, Widren Water District and unincorporated areas.

**Project Description:** Under the umbrella of the San Luis-delta Mendota Water Authority is the Grassland Basin Drainage Activity. This is part of a 97,000 acre drainage area in the San Joaquin Valley bounded Interstate 5, Dos Palos and Mendota that has historically discharged subsurface tilewater to the San Joaquin River. Recently this entity implemented the Grassland Bypass Project which utilizes a portion of the San Luis Drain to convey drainage water to the San Joaquin River and to bypass the grasslands wetlands area for environmental benefit purposes. Historically this discharge of drainage water included a combination of subsurface tilewater and surface tailwater.

In order to fully manage the drainage water discharge from the Grassland area and to coordinate it with flows along the San Joaquin River and the San Joaquin Delta a real time monitoring component and management in the local area is necessary. The project would include installing real time monitoring stations at key discharge points from the Grassland Drainage area. Monitoring stations would include measuring facilities, data collection platforms and remote transmission facilities for real time acquisition of flow and electrical conductivity data. The location of the key components is shown on the attached map. Real time stations have been installed at PE-1, DJ-1, and FC-1. It is necessary to install components at CH-2, PO-2, BV-3, and FC-5.

**Expected Water Quality Benefits:**

It is anticipated that this real time monitoring program would be used in conjunction with real time stations on the San Joaquin River that have been installed by the San Joaquin River Management Program, California Department of Water Resources, the U.S. Bureau of Reclamation and the U.S. Geological Survey. These stations would thus be part of a river-wide monitoring program and therefore management scenarios can be developed around this information to minimize the discharge of subsurface drainage water to the San Joaquin River and to the Sacramento-San Joaquin River Delta.

**Map:** See location map attached.

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             | x         |                     |                |
| Planning                 |             | x         |                     |                |
| Design                   |             |           | 4/1/97              |                |
| Environmental Compliance |             | x         |                     |                |

**Anticipated Construction Start Date:** May 1, 1997

**Anticipated Construction Completion Date:** - September 30, 1997

**Project Cost Summary:**

|                          |   |
|--------------------------|---|
| Study:                   | \$ _____                                  |
| Planning:                | \$ <u>10,000</u> (Completed)              |
| Design:                  | \$ <u>100,000</u> (Includes construction) |
| Construction:            | \$ _____                                  |
| Construction Management: | \$ _____                                  |
| Administration:          | \$ <u>40,000</u> (Water testing)          |

**Total:** \$ 150,000

**Estimated Operations and Maintenance Cost:**

The operation and maintenance cost for the facilities will be budgeted under the Grassland Basin Drainage Activity and would be contributed to by the local agencies.

**Estimated Agency Contributions:**

The planning and water quality testing would be contributed by the Grassland Basin Drainage Activity.

**Other Considerations:**

The project is consistent with the subsurface drainage source control, specifically efficient water management in selenium source areas. It is understood that source water application in this particular area must be managed in conjunction with subsurface drainage discharges. This real time monitoring component project will be utilized in the water management program for the various districts to minimize drainage discharges which will reduce discharges of selenium, salinity and suspended solids to the San Joaquin River and to the Sacramento-San Joaquin River Delta.

# **OTHER POTENTIAL IMPLEMENTATION PROJECTS**

**Project Name:** Storage and timed release of sub-surface drainage.

**Project Number:** 1-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Storage would encompass storage in surface reservoirs, or in the soil, as appropriate. Surface impoundments would be similar to demonstration ponds constructed in the Grasslands subarea to control discharges to the San Joaquin River and improve compliance with downstream standards. Storage in the soil can be achieved by operation of drainage systems, including blocking of drains during certain periods of the year.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|          | In Progress | Completed | Expected Completion | Not Applicable |
|----------|-------------|-----------|---------------------|----------------|
| Study    |             |           |                     |                |
| Planning |             |           |                     |                |
| Design   |             |           |                     |                |

|                             |  |  |  |  |
|-----------------------------|--|--|--|--|
| Environmental<br>Compliance |  |  |  |  |
|-----------------------------|--|--|--|--|

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                          |          |
|------------------------------|--------------------------|----------|
| <b>Project Cost Summary:</b> | Study:                   | \$ _____ |
|                              | Planning:                | \$ _____ |
|                              | Design:                  | \$ _____ |
|                              | Construction:            | \$ _____ |
|                              | Construction Management: | \$ _____ |
|                              | Administration:          | \$ _____ |
|                              | <b>Total:</b>            | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Create wetlands to accomplish the several things simultaneously.

**Project Number:** 1-2

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Create wetlands to accomplish the following simultaneously

- Subsidence control.
- Levee protection.
- Pesticide breakdown.
- Settling of sediment.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                                 |          |
|------------------------------|---------------------------------|----------|
| <b>Project Cost Summary:</b> | <b>Study:</b>                   | \$ _____ |
|                              | <b>Planning:</b>                | \$ _____ |
|                              | <b>Design:</b>                  | \$ _____ |
|                              | <b>Construction:</b>            | \$ _____ |
|                              | <b>Construction Management:</b> | \$ _____ |
|                              | <b>Administration:</b>          | \$ _____ |
|                              | <b>Total:</b>                   | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**



**Project Name:** Implementation of Integrated pest management in surface drainage source areas, especially for parameters of concern.

**Project Number:** 11-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Because pesticides in agricultural surface drainage in the central Valley is among the primary water quality concerns associated with this drainage, implementation is IPM practices that reduce pesticide loading is considered to be high priority. Integrated pest management was considered most promising because it has already received substantial research attention and has been widely implemented; however, the group considered that additional funds for extension, as well as other training and education related to integrated pest management would encourage more wide-spread application of existing technology. For example, certain IPM technologies require some start-up training or facilities costs that must be borne by farmers. Incentives could partially defray these costs, thereby encouraging farmers to implement IPM more widely. The potential of precision farming technology to enhance application of IPM technology was noted, along with the possibility of reducing nutrient loads by precision farming. IPM does not necessarily eliminate pesticide use but, rather, focuses on cost-effective use of pesticides in combination with other strategies. The project should concentrate efforts on known or suspected source areas/practices, such as dormant sprays, and spraying near waterways. This project should result in reduced pesticide loads and, therefore, reduce pesticide loads to waterways tributary to the Delta.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Alter pesticide chemistry and define fate and transport of constituents of

concern.

**Project Number:** 11-2

**Project Manager:**

**Agency Name:**

**Address:**

**Name/Title of Project Manager:**

**Phone/Fax/E-mail:**

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

**Project Description:** Research on the fate and transport of currently used and proposed pesticides, and coordination with regulatory agencies responsible for registering these pesticides would be the main activities. The rationale for this project is the following:

- A number of new pesticide chemistries have the potential to reduce pesticide loading or environmental risks of pesticide use. This would result from lower concentrations of potent active ingredients, or from identification of active ingredients with lower environmental risks. However, regulatory hurdles for pesticide registration are currently very rigorous. The cost of registering new materials is high.
- Although monitoring data have demonstrated the presence of pesticides at levels that could cause environmental harm in Delta waterways, the origin of these pesticides and their modes of transport are not well understood. Therefore, additional research focused on clarifying the fate and transport of these pesticide materials was proposed as a project that could facilitate development of more effective source control programs in the short run.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                |
|--------------------------|----------------|
| Study:                   | \$_____        |
| Planning:                | \$_____        |
| Design:                  | \$_____        |
| Construction:            | \$_____        |
| Construction Management: | \$_____        |
| Administration:          | \$_____        |
| <b>Total:</b>            | <b>\$_____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Habitat Enhancement Landowner Program (HELP)

**Project Number:** 11-3

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Under this program, sponsored by Farm Bureau Western Growers and Counties opt to participate in habitat enhancement. Landowners designate portions of their land and enhance habitat through revegetation, hydrologic modification, etc. The principle of the program are the following:

- Private landowners control much of the land area that could provide enhanced habitat.
- Much potential habitat lies adjacent to existing waterways.
- Habitat enhancement and water quality objectives can be achieved simultaneously, especially if measures such as filter strips and filtering wetlands and settling ponds are implemented with this in mind.
- To enhance habitat, landowners must be protected from additional Endangered Species Act sanctions. Specifically, farmers participating in the program are protected from incidental and accidental take sanctions that might result from endangered species using habitat created by the program.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Efficient water management in selenium-source areas.

**Project Number:** 11-4

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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**Project Description:** This measure would include agricultural and irrigation practices that would reduce the amount of deep percolation, while providing for sustainable irrigation practices. The project would be implemented in areas that produce subsurface drainage with high selenium concentration or in areas that are significant sources of selenium-rich groundwater feeding areas that produce subsurface drainage with high selenium concentrations. Mechanisms for implementation would include Assembly Bill 3616, which requires water conservation plans to be developed by local water districts and additional incentives for improved water management focused on areas with high levels of selenium in shallow groundwater. Practices implemented in these areas might include improved irrigation practices, such as installation of improved irrigation systems, improved irrigation scheduling. Modifications of cropping patterns was discussed as a means to reduce deep percolation. It was pointed out that cropping patterns are market driven and for individual farmers, may depend on expertise, market conditions, and existing contracts.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**



**Project Name:** Reconstruct subsurface drainage systems.

**Project Number:** 11-6

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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**Project Description:** Subsurface tile drains in selenium enriched areas would be reconstructed to be four or five feet deep, just below the root zone, compared to current systems which are much deeper. The shallower depth of the drains would enable better interception of surface-percolated drainage without picking up selenium from the underlying geologic formation. It is understood that, because the reconstructed drains were shallower, there would have to be a more extensive network of drains, which would have a cost impact on the project. The effectiveness of the project will be site-specific, and would have to be evaluated on that basis.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                |
|--------------------------|----------------|
| Study:                   | \$_____        |
| Planning:                | \$_____        |
| Design:                  | \$_____        |
| Construction:            | \$_____        |
| Construction Management: | \$_____        |
| Administration:          | \$_____        |
| <b>Total:</b>            | <b>\$_____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Temporarily store drainage in wetlands or other impoundments, then time release to avoid creating high concentrations of parameters of concern.

**Project Number:** 11-7

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** - - \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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\_\_\_\_\_

**Project Description:**

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                          |          |
|------------------------------|--------------------------|----------|
| <b>Project Cost Summary:</b> | Study:                   | \$ _____ |
|                              | Planning:                | \$ _____ |
|                              | Design:                  | \$ _____ |
|                              | Construction:            | \$ _____ |
|                              | Construction Management: | \$ _____ |
|                              | Administration:          | \$ _____ |
|                              | <b>Total:</b>            | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Optimal tailwater recovery systems.

**Project Number:** 11-8

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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**Project Description:** These systems would manage agricultural tailwater in keeping with sustainable irrigation practice, but to reduce loading of water quality parameters of concern to waters within the geographic scope. It was noted that tailwater recovery is widely implemented, but that there are certainly opportunities to benefit water quality through broader implementation.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                          |          |
|------------------------------|--------------------------|----------|
| <b>Project Cost Summary:</b> | Study:                   | \$ _____ |
|                              | Planning:                | \$ _____ |
|                              | Design:                  | \$ _____ |
|                              | Construction:            | \$ _____ |
|                              | Construction Management: | \$ _____ |
|                              | Administration:          | \$ _____ |
|                              | <b>Total:</b>            | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Review sludge management in land application systems.

**Project Number:** 11-9

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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\_\_\_\_\_

**Project Description:**

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**



**Project Name:** Fallowing of lands in selenium-source areas through a voluntary program.

**Project Number:** 11-10

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Lands producing subsurface drainage with high levels of selenium would be fallowed, particularly during drought years. The project would be financed through lease payments to participating farmers as an incentive to fallow land during these critical periods.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                                 |          |
|------------------------------|---------------------------------|----------|
| <b>Project Cost Summary:</b> | <b>Study:</b>                   | \$ _____ |
|                              | <b>Planning:</b>                | \$ _____ |
|                              | <b>Design:</b>                  | \$ _____ |
|                              | <b>Construction:</b>            | \$ _____ |
|                              | <b>Construction Management:</b> | \$ _____ |
|                              | <b>Administration:</b>          | \$ _____ |
|                              | <b>Total:</b>                   | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Implementation of drainage water reuse/agroforestry/evaporation pond/salt recycling systems on a pilot scale.

**Project Number:** 11-11

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** - - \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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\_\_\_\_\_

**Project Description:**

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                          |          |
|------------------------------|--------------------------|----------|
| <b>Project Cost Summary:</b> | Study:                   | \$ _____ |
|                              | Planning:                | \$ _____ |
|                              | Design:                  | \$ _____ |
|                              | Construction:            | \$ _____ |
|                              | Construction Management: | \$ _____ |
|                              | Administration:          | \$ _____ |
|                              | <b>Total:</b>            | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Installation of shallow subsurface drains.

**Project Number:** 13-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:**

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                |
|--------------------------|----------------|
| Study:                   | \$_____        |
| Planning:                | \$_____        |
| Design:                  | \$_____        |
| Construction:            | \$_____        |
| Construction Management: | \$_____        |
| Administration:          | \$_____        |
| <b>Total:</b>            | <b>\$_____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Treatment of wetlands for selenium volatilization.

**Project Number:** 14-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:**

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |          |
|--------------------------|----------|
| Study:                   | \$ _____ |
| Planning:                | \$ _____ |
| Design:                  | \$ _____ |
| Construction:            | \$ _____ |
| Construction Management: | \$ _____ |
| Administration:          | \$ _____ |
| <b>Total:</b>            | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**



**Project Name:** Habitat Enhancement Landowner Program (HELP)

**Project Number:** 15-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_

\_\_\_\_\_

**Project Description:** Under this program, sponsored by Farm Bureau Western Growers and Counties opt to participate in habitat enhancement. Landowners designate portions of their land and enhance habitat through revegetation, hydrologic modification, etc. The principle of the program are the following:

- Private landowners control much of the land area that could provide enhanced habitat.
- Much potential habitat lies adjacent to existing waterways.
- Habitat enhancement and water quality objectives can be achieved simultaneously, especially if measures such as filter strips and filtering wetlands and settling ponds are implemented with this in mind.
- To enhance habitat, landowners must be protected from additional Endangered Species Act sanctions. Specifically, farmers participating in the program are protected from incidental and accidental take sanctions that might result from endangered species using habitat created by the program.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:****Estimated Agency Contributions:****Other Considerations:**

**Project Name:** Create wetlands to accomplish the several things simultaneously.

**Project Number:** 15-2

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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\_\_\_\_\_

**Project Description:** Create wetlands to accomplish the following simultaneously

- Subsidence control.
- Levee protection.
- Pesticide breakdown.
- Settling of sediment.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                          |          |
|------------------------------|--------------------------|----------|
| <b>Project Cost Summary:</b> | Study:                   | \$ _____ |
|                              | Planning:                | \$ _____ |
|                              | Design:                  | \$ _____ |
|                              | Construction:            | \$ _____ |
|                              | Construction Management: | \$ _____ |
|                              | Administration:          | \$ _____ |
|                              | <b>Total:</b>            | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Wider implementation of Ecolaboratories (irrigation system performance evaluation).

**Project Number:** 15-3

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** - - \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

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\_\_\_\_\_

**Project Description**

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                                 |          |
|------------------------------|---------------------------------|----------|
| <b>Project Cost Summary:</b> | <b>Study:</b>                   | \$ _____ |
|                              | <b>Planning:</b>                | \$ _____ |
|                              | <b>Design:</b>                  | \$ _____ |
|                              | <b>Construction:</b>            | \$ _____ |
|                              | <b>Construction Management:</b> | \$ _____ |
|                              | <b>Administration:</b>          | \$ _____ |
|                              | <b>Total:</b>                   | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Fallowing of lands in selenium-source areas through a voluntary program.

**Project Number:** 15-4

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Lands producing subsurface drainage with high levels of selenium would be fallowed, particularly during drought years. The project would be financed through lease payments to participating farmers as an incentive to fallow land during these critical periods.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

|                              |                          |          |
|------------------------------|--------------------------|----------|
| <b>Project Cost Summary:</b> | Study:                   | \$ _____ |
|                              | Planning:                | \$ _____ |
|                              | Design:                  | \$ _____ |
|                              | Construction:            | \$ _____ |
|                              | Construction Management: | \$ _____ |
|                              | Administration:          | \$ _____ |
|                              | <b>Total:</b>            | \$ _____ |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**



**Project Name:** Treatment in wetlands for selenium volatilization.

**Project Number:** 16-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:**

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Implementation of Integrated Pest Management in surface drainage source areas, especially for parameters of concern.

**Project Number:** 32B-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Because pesticides in agricultural surface drainage in the central Valley is among the primary water quality concerns associated with this drainage, implementation is IPM practices that reduce pesticide loading is considered to be high priority. Integrated pest management was considered most promising because it has already received substantial research attention and has been widely implemented; however, the group considered that additional funds for extension, as well as other training and education related to integrated pest management would encourage more wide-spread application of existing technology. For example, certain IPM technologies require some start-up training or facilities costs that must be borne by farmers. Incentives could partially defray these costs, thereby encouraging farmers to implement IPM more widely. The potential of precision farming technology to enhance application of IPM technology was noted, along with the possibility of reducing nutrient loads by precision farming. IPM does not necessarily eliminate pesticide use but, rather, focuses on cost-effective use of pesticides in combination with other strategies. The project should concentrate efforts on known or suspected source areas/practices, such as dormant sprays, and spraying near waterways. This project should result in reduced pesticide loads and, therefore, reduce pesticide loads to waterways tributary to the Delta.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_

**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:**

**Estimated Agency Contributions:**

**Other Considerations:**

**Project Name:** Habitat Enhancement Landowner Program (HELP)

**Project Number:** 33-1

**Project Manager:** \_\_\_\_\_

**Agency Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Name/Title of Project Manager:** \_\_\_\_\_

**Phone/Fax/E-mail:** \_\_\_\_\_

**Other involved agencies:(e.g. cost sharing partners, co-managers)**

\_\_\_\_\_  
\_\_\_\_\_

**Project Description:** Under this program, sponsored by Farm Bureau Western Growers and Counties opt to participate in habitat enhancement. Landowners designate portions of their land and enhance habitat through revegetation, hydrologic modification, etc. The principle of the program are the following:

- Private landowners control much of the land area that could provide enhanced habitat.
- Much potential habitat lies adjacent to existing waterways.
- Habitat enhancement and water quality objectives can be achieved simultaneously, especially if measures such as filter strips and filtering wetlands and settling ponds are implemented with this in mind.
- To enhance habitat, landowners must be protected from additional Endangered Species Act sanctions. Specifically, farmers participating in the program are protected from incidental and accidental take sanctions that might result from endangered species using habitat created by the program.

**Expected Water Quality Benefits:**

**Map:**

**Project Status:**

|                          | In Progress | Completed | Expected Completion | Not Applicable |
|--------------------------|-------------|-----------|---------------------|----------------|
| Study                    |             |           |                     |                |
| Planning                 |             |           |                     |                |
| Design                   |             |           |                     |                |
| Environmental Compliance |             |           |                     |                |

**Anticipated Construction Start Date:** \_\_\_\_\_**Anticipated Construction Completion Date:** \_\_\_\_\_

**Project Cost Summary:**

|                          |                 |
|--------------------------|-----------------|
| Study:                   | \$ _____        |
| Planning:                | \$ _____        |
| Design:                  | \$ _____        |
| Construction:            | \$ _____        |
| Construction Management: | \$ _____        |
| Administration:          | \$ _____        |
| <b>Total:</b>            | <b>\$ _____</b> |

**Estimated Operations and Maintenance Cost:****Estimated Agency Contributions:****Other Considerations:**